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QUESTION OF ANTARCTICA

Study on the establishment of a United Nations-sponsored station in Antarctica

Report of the Secretary-General

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I. INTRODUCTION

1. In paragraph 5 of its resolution 45/78 A of 12 December 1990 the General Assembly requested the Secretary-General to undertake a comprehensive study with the help of relevant United Nations programmes and specialized agencies such as the World Meteorological Organization and the United Nations Environment Programme, using available data and resources, on the establishment of a United Nations-sponsored station in Antarctica with a view to promoting coordinated international cooperation in scientific research for the benefit of mankind, particularly the importance of Antarctica to the global environment and ecosystems, as well as to act as an early-warning system on climate change and accidents, and submit a report thereon to the General Assembly at its forty-sixth session.

2. In pursuance of resolution 45/78 A, the Secretary-General, on 27 February 1991, addressed a note verbale to Member States in which he invited them to submit, not later than 30 May 1991, any pertinent information they were prepared to make available in pursuance of the relevant provisions of the resolution.

3. Letters were also sent to the relevant specialized agencies, programmes, organs, organizations and bodies of the United Nations system and to other relevant international organizations inviting them as well to submit comments and any relevant information they may have on the scope and practical steps envisaged in establishing a United Nations-sponsored station in Antarctica.

4. Furthermore, in order to obtain more detailed information from countries and organizations with expertise presently operating in the Antarctic, a questionnaire (see annex I) was sent to the Consultative Parties to the Antarctic Treaty, to Greenpeace International, and to the Council of Managers of National Antarctic Programmes with the purpose of seeking their expert advice on matters related to the establishment and operation of a scientific station in Antarctica.

5. As at 31 July 1991, three Member States, one of them acting on behalf of the States parties to the Antarctic Treaty, replied to the Secretary-General's note verbale. Those replies appear in annex II to the present report. Among the replies from the relevant organization and programmes received in connection with resolution 45/78 A, six expressed views on the establishment of a United Nations-sponsored station in Antarctica. Excerpts from the relevant parts of these replies appear in annex II to the present report. Only one reply, that of Greenpeace International, was received to the questionnaire. This reply appears in annex III to the present report.

6. It should be noted that in addition to the information requested pursuant to paragraph 5 of resolution 45/78 A, relevant information from communciations received pursuant to General Assembly resolutions 38/77 of 15 December 1983 and 40/156 A of 16 December 1985 was also considered in the preparation of this report.

7. It is also worth mentioning that some questions related to the subject of establishing a United Nations-sponsored station in Antarctica, such as: Antarctic science, scientific activities of international organizations in Antarctica, involvement of the relevant specialized agencies and intergovernmental organizations in the Antarctic Treaty system, and availability to the United Nations of information from the Antarctic Treaty Consultative Parties on their respective activities and in their deliberations regarding Antarctica, have been dealt with in detail in the Secretary-General's reports on the Question of Antarctica submitted to the thirty-ninth (A/39/583) and forty-first (A/41/722) sessions of the General Assembly. These documents may be used as a source of additional information on this subject.

8. The present report provides only technical information relevant to the establishment and operation of a scientific station in Antarctica. Therefore, the cost estimates for the communication equipment, means of transportation and some of the basic meteorological equipment that may be necessary for the operation of the station (see annex V) are for illustrative purpose only, and the costs are approximate.

II. GENERAL CONSIDERATIONS WITH RESPECT TO THE ESTABLISHMENT OF A UNITED NATIONS-SPONSORED STATION IN ANTARCTICA

9. In order to meet the objectives in paragraph 5 of resolution 45/78 A it appears that a United Nations-sponsored station would have to be operational all year round to provide both a permanent base and facilities for increased activities during the summer.

10. The site of the station would be of primary importance to its functioning for several reasons. First, the choice of site would depend to a very large extent on the character and scope of the scientific activities that would be carried out by the station in conformity with its main goals. Secondly, the specific weather and terrain conditions at the site and its accessibility from air, sea and land would be important in order to assure normal conditions for work and recreation and to lower the costs of construction, maintenance and supply. And third, special attention should be paid to the necessity of bringing to a minimum the detrimental effects the establishment and functioning of the station would have on the Antarctic environment. (For more information on that subject, see excerpts from the reply of the United Nations Environmental Programme in annex III.)

11. The general concept seems to indicate that the living quarters should provide for all collective activities. The living quarters should include a dining room and a kitchen, a living room, a library, room for recreation, and (because of technical requirements) all water installations (laundry, lavatories, photo laboratories). It is desirable that sleeping quarters are provided for in a separate building, so as to meet requirements of silence and privacy.

12. For scientific work each discipline should have separate quarters. It is desirable, however, that when possible these quarters be grouped in one or two buildings in order to simplify the problems of heating, electrical supply and fire prevention. The development of remote recording and remote control techniques make that task easier by allowing some of the equipment to be put in separate simplified shelters outside the main laboratories. Separate installations should be constructed for logistical and communication purposes. Due to the remoteness of Antarctica and its harsh climate, the programme for the establishment and development of the station will inevitably be largely dependent on the availability of logistical means. Thus, the accessibility by sea and/or by air, the number and the type of ships and aircraft to be used, the possibilities of constructing docking and landing facilities will be of primary importance, particularly at the first stages of operation.

13. Since all equipment and material to Antarctica is to be shipped to the continent by sea and, if possible, in some cases by air, construction plans should necessarily envisage procurement of services of at least one ice-breaker, an ice-strengthened cargo ship (some ice-breakers have substantial cargo potential) and an ice-strengthened tanker. Both at the initial and at the later stages of its operation, the United Nations-sponsored Antarctic station will need the services of specially adapted cargo aircraft, such as the LC-140 Hercules, or the AN-2 (Soviet stations also use the smaller IL-14 and IL18D). For summer operations a fleet of helicopters (such as UH-IH, Hughes 500C, Bell 206B) and/or fixed-wing aircraft (such as Twin Otter) should be envisaged. Necessarily, both for winter and summer operations, the station should have its own diversified fleet of vehicles, including four-wheel-drive pickup trucks, all-wheel-drive dump trucks and flatbeds, tracked vehicles, articulated vehicles with wide low-pressure tires, caterpillars, motor toboggans, snow blowers and graders.

14. It is impossible at this point to estimate the number and type of permanent installations to be erected or the specifications for them or for the vehicles to be used, since they will depend, among other things, on the scope and character of the scientific work to be performed and the location of the station. The scientific programme of the station will also determine the optimal number and type of personnel to be employed. However, annex V does attempt to provide illustrative cost estimates for some communications equipment, means of transportation and basic meteorological equipment that may be necessary for the operation of a United Nations-sponsored station in Antarctica.

15. In addition to the technical aspects, political, legal, organizational, administrative and financial considerations would also have to be addressed before the question on whether to establish a United Nations-sponsored base can be considered.

16. In this respect, it should be noted that article X of the Antarctic Treaty obligates Contracting Parties to exert appropriate efforts, consistent with the Charter of the United Nations, to ensure that no one engages in any

activity in Antarctica contrary to the principles or purposes of the Antarctic Treaty. At the same time, the Antarctic Treaty, in article III, calls for the establishment of cooperative working relations with those specialized agencies of the United Nations and other international organizations having a scientific or technical interest in Antarctica.

III. CONCLUDING REMARKS

17. Seen against the background of the already existing system of international cooperation in the field of Antarctic scientific research, both at the level of direct cooperation between Governments and at the level of the specialized agencies of the United Nations and a large variety of international governmental and non-governmental organizations, the issue of the establishment of a United Nations-sponsored station in Antarctica presents a formidable endeavour. Therefore the execution of such a project would constitute a complicated exercise.

18. Moreover, bearing in mind the multitude of scientific, legal, logistical, and financial questions relevant to the establishment of a United Nations-sponsored station in Antarctica, an active involvement on the part of the Member States with expertise in the area, relevant United Nations programmes, specialized agencies and other international governmental and non-governmental organizations, is essential and should be assured if such a project is considered.

ANNEX I

Questionnaire to Antarctic Treaty Consultative Parties on the establishment and operation of a scientific station in Antarctica

1. What were the principal motivating factors for the establishment of a scientific station in Antarctica by your country?

2. In taking a decision on the establishment of a scientific station in Antarctica what role did the following considerations play:

(a) Nature of scientific research;

(b) Locale and/or geographical factors;

(c) Operational requirements, including personnel;

(d) Logistical support;

(e) Budgetary considerations.

3. Were there any other key factors that had an impact on such a decision?

4. What kind of consultations did you find necessary to undertake with any other country having experience in operating a scientific station in Antarctica, and to what extent did the information obtained facilitate your decision?

5. What influenced your judgement as to the particular type of research pursued? To what extent did your decision depend on the research already undertaken in Antarctica and how did you avoid the probability of duplication in research efforts?

6. In operating a scientific station in Antarctica did you find it necessary to seek the assistance of and to rely on cooperation of Governments having stations in the area?

7. In your view, what role was relegated to cooperation with the organizations having expertise and interest in scientific research in Antarctica?

8. Given the extremely difficult conditions for accurate telecommunication in Antarctica, what are the special liaison requirements?

9. What guided you in deciding to operate a year-round scientific station or a seasonal one?

10. What would be your advice concerning construction requirements for the station?

11. On the basis of your experience, what could you suggest as to the means of making the operation of the scientific station cost-effective?

12. What kind of organizational structure is needed to monitor the operation of a scientific station? What role could be played by satellites or ships in this regard?

ANNEX II

Replies received from Governments

GERMANY

[Original: English]

[29 May 1991]

1. On behalf of the States parties to the Antarctic Treaty I have the honour to refer to your letter of 17 April 1991 concerning questions arising in connection with the operation of scientific stations in Antarctica. In the First Committee at the forty-fifth session of the General Assembly, the delegation of Australia had already presented the common views of the States parties to the Antarctic Treaty on this subject.

2. States parties have established a number of scientific stations in Antarctica. These stations are designed for different research purposes and vary in age, size, and equipment. All play a part in the cooperative research effort which is integral to the Antarctic Treaty system.

3. Through accession to the Antarctic Treaty, States which have an interest in scientific research in Antarctica can take advantage of the experience of the Treaty Parties that have already been active in this field. In the course of 15 Antarctic Treaty Consultative Meetings, numerous recommendations that are relevant to the conduct of scientific research and the operation of scientific stations have been adopted, most recently at the Fifteenth Meeting in Paris in 1989. As you are aware, States parties have informed the Secretary-General of the achievements of the Antarctic Treaty system, and reports of the consultative meetings have been made available. Treaty Parties have provided the United Nations with considerable documentation on the operation of the Treaty system.

4. As regards scientific questions or technical matters, the States parties to the Antarctic Treaty wish to recall that they have established cooperative working relations with those specialized agencies of the United Nations having a scientific or technical interest in Antarctica. Moreover, scientific research in Antarctica has been conducted for more than 30 years with the active participation of scientific organizations in such a manner as to enable those organizations to fulfil their objectives.

MAURITIUS

[Original: English]

[25 July 1991]

1. The Permanent Representative of Mauritius to the United Nations presents his compliments to the Secretary-General of the United Nations, and with reference to his note of 27 February 1991 regarding the question of Antarctica, has the honour to inform him that the Government of Mauritius supports the proposal to set up a United Nations-sponsored station in Antarctica for the following reasons:

(a) The present Antarctic Treaty as an instrument for the conservation of the world's last remaining great wilderness is inadequate as judged by its position on mineral resource activities (Convention on the Regulation of Antarctic Mineral Resource Activities);

(b) Only nations that are currently undertaking significant research activities in the Antarctic region can become a contracting party. A United Nations scientific research station would increase the possibilities for scientists to carry out relevant research;

(c) The establishment of a United Nations research station would stop the proliferation of a large number of research stations, the impact of which on the Antarctic environment is already considerable. Waste accumulation and environmental damage caused by pollution and the high concentration of buildings on King George Island is a classic example. Some stations have been constructed in breach of the Agreed Measures for the Conservation of Antarctic Fauna and Flora;

(d) Only the United Nations can enforce the Convention on the Conservation of Antarctic Marine Living Resources and can enforce the regulatory mechanisms to conserve krill of the Southern Ocean for the decimated whale population.

2. It would also appreciate it if the report on the state of the environment in Antarctica would highlight the following issues:

(a) The conservation of the unique wildlife in that region;

(b) It would stress the negative impacts of tourism and high concentration of research stations in that region and the logistic infrastructure needed to service them, e.g. airstrips, fuel stations, etc.;

(c) Some Antarctic research addresses issues fundamental to human understanding of the global environment. Ice cores hold a record of past climatic and atmospheric changes and should be available to the scientific community of all Member States of the United Nations.

THAILAND

[Original: English]

[5 June 1991]

1. The Government of Thailand is of the view that the ecological environment of Antarctica is fragile and could be easily contaminated by excessive exploitation.

2. The Government of Thailand supports any initiatives or studies aimed at the conservation and protection of Antarctica.

3. The Government of Thailand is also of the view that a comprehensive study of the establishment of a United Nations-sponsored station in Antarctica, to be prepared by the Secretary-General (General Assembly resolution 45/78 A, para. 5), should also take into account information and the views of various non-governmental organizations.

ANNEX III

Excerpts from the replies of relevant United Nations programmes and specialized agencies

UNITED NATIONS ENVIRONMENT PROGRAMME

The Global Environment Monitoring System Programme Activity Centre

[Original: English]

[17 July 1991]

1. Should the General Assembly take a decision that a station should be established, a programme for the station would have to be developed based on the review of activities being carried out and the gaps identified. Expert advice will also be needed to address the logistics and costs involved in the establishment of a station in Antarctica.

2. A series of decisions will have to be taken ranging from the proposed location of the base, research programmes planned as well as the composition of staff, males only or males and females.

Base location

3. The location of the base will depend on the research needs. It may be possible that the best place for biological studies might not be appropriate for meteorological or ozone studies.

4. A few of the Antarctic bases are located in the middle of the continent or near the South Pole. These bases are almost exclusively dedicated to meteorological and glaciological studies. Some of them have been constructed underground. Access to this type of base is through air-strips, planes equipped with skis and sometimes with snow cats from coastal bases or supporting vessels.

5. The majority of the bases are on islands or near the sea or coastline, where meteorological conditions are milder because of the sea interactions. Sheltered bays are normally preferred for base installations, with easy access to penguins or seal colonies. Glaciers on nearby mountains are required for the construction of ice airstrips to receive light planes with skis. Glaciers are also melted for use as fresh water. For ornithological studies it is also necessary that the base be located near a penguin rookery or other sea bird colonies.

6. A number of bases have been constructed on the Antarctic Peninsula, Victoria Land, Mac Robertson Land or Maud Land. The Antarctic Peninsula has

the greatest number of bases, because of its proximity to South America. Access to these bases is through helicopters, planes with skis or support vessels.

7. A third possibility is to build a coastal biological research base (like Palmer Station) with docking facilities and a second meteorological station deeper inside the continent with access by air or through snow-cat support.

8. A support station is almost indispensable. For example, the National Science Foundation (USA) operates one in Ushuaia, Argentina, and one in Punta Arenas, Chile. Support stations keep in permanent radio contact with the bases, provide instant support in case of ship damage due to ice conditions, evacuate by air or sea victims of serious accidents, provide spare parts, etc. They are also responsible for the supply of fresh water, fuel, food and medicines. The support station also deals with customs, immigration officers, local hospitals, etc.

9. When selecting the location of the base, consideration must be given to the fact that some sectors of the Antarctic Continent are claimed by several countries.

Activities to be carried out

10. Activities will be determined by the review being done and the identification of gaps.

Composition of the scientific staff

11. A decision will have to be taken if the staff is going to be all male or male and female. Some of the scientific bases already established in Antarctica allow married couples to live in separate small buildings, with a certain degree of privacy. Others, such as the British bases operated by the Antarctic British Survey, do not allow female researchers. Some countries allow females only during the summer period.

12. The decision will have to be taken early so as to allow space for female researchers at the base and support vessels.

Intergovernmental Advisory Panel

13. UNEP feels that there will be a need for an Intergovernmental Advisory Panel. The Panel will review the issues to be addressed as well as the results from the programmes being implemented. Detailed terms of reference as well as the composition of the Panel will have to be decided at a later stage.

14. Logistics will have to be looked into. It might be necessary to have a permanent office, which would contact the base, as well as the support station, regularly and deal with the day-to-day operations.

Costs of a United Nations station in Antarctica

15. Detailed costs will have to be worked out at a later stage when decisions have been taken with respect to location of the base, research activities, number of staff, permanent or summer base only, etc.

16. A very rough estimate would be in the order of $US 10 million for yearly running costs. This estimate includes salaries of approximately 20 researchers and 10 support staff.

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

[Original: English]

[30 May 1991]

As regards the study called for in paragraph 5 of resolution 45/78 A, on the establishment of a United Nations-sponsored station in Antarctica, it is the view of FAO that while a United Nations station in Antarctica may help developing countries to increase their interest and competence in the conservation of this continent, it does not appear however to be a priority for many developing countries. An independent assessment of fishery resources (independent from fisheries interests) could be useful but very costly. FAO believes that strengthening CCAMLR would be a more efficient way to reach the objective and that is an area where the Organization could help within its very limited means. Any particular effort of the Fisheries Department of FAO on this issue would definitely require additional resources.

UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION

[Original: English]

[12 July 1991]

1. The Intergovernmental Oceanographic Commission is interested in promoting the establishment of a United Nations-sponsored station in Antarctica, which could play an important role (if suitably located) in the oceanographic observations (sea level, some physical, chemical and biological variables) required for monitoring global environmental changes, as well as coordinating similar observations in other Antarctic stations.

2. A United Nations station in Antarctica would certainly provide tremendous opportunities in international cooperation in research and training in the Antarctic as well as in global problems.

3. This is the first such venture, involving the active participation of developing nations, since the International Geophysical Year (IGY) launched at

the initiative of the International Council of Scientific Unions in the late 1950s and carried out through international cooperation.

4. UNESCO could promote this venture in the fields of geophysics (seismology, volcanology), geology and geochemistry through its own expertise and programmes or through cooperation with international scientific communities.

5. However, one must not underestimate the political difficulty of establishing such an international research station under the auspices of the United Nations. When the resolution of the General Assembly was adopted, the 38 Antarctic Treaty Consultative Parties did not participate in the vote, and the delegate of Australia, speaking on behalf of the Treaty Parties, said that the deliberations of this issue were a meaningless ritual. It is, therefore, predictable that the establishment of such a station would encounter considerable practical difficulties.

INTERNATIONAL CIVIL AVIATION ORGANIZATION

[Original: English]

[12 June 1991]

1. The Future Air Navigation System (FANS) under study by ICAO, will be largely dependent upon satellite based communications, navigation and surveillance systems and is expected to provide significant improvements to existing communications, navigation and surveillance (CNS) systems throughout the world. The improved aeronautical communications, navigation and surveillance services envisaged in FANS could benefit future civil aviation support, including search and rescue activities, of any United Nations-sponsored activities in the Antarctica region.

2. Regarding the field of aviation meteorology, it should be noted that provisions are being developed in ICAO concerning the use of data link technology for the automatic air reporting of meteorological information from aircraft in flight. Following the inclusion of these provisions into ICAO documents, envisaged in 1995, and the installation of the necessary equipment on aircraft operating over Antarctica, a new source of meteorological data (upper-wind, upper-air temperature and possibly also upper-air humidity data), will become available, which would support the scientific research on the importance of Antarctica to the global environment and ecosystems, and on other subjects mentioned in General Assembly resolution 45/78 A.

3. Besides this, in the development of the ICAO world area forecast system (WAFS) account has already been taken of the need to make WAFS data available for flights from South America to Antarctica. Arrangements are in progress in one of the world area forecast system provider States (United States), as follow-up to a recommendation of the Second Caribbean/South American Regional

Air Navigation Meeting (1990), to produce wind/temperature forecasts in chart form, covering areas suitable for flights from South America to New Zealand and to any base in Antarctica.

WORLD METEOROLOGICAL ORGANIZATION

[Original: English]

[5 April 1991]

1. The Eleventh WMO Congress was informed that the General Assembly, on 13 December 1990, adopted resolution 45/78 A on the question of Antarctica which inter alia requested the Secretary-General to undertake with assistance of WMO and UNEP a comprehensive study on the establishment of a United Nations-sponsored station in Antarctica "with a view to promoting coordinated international cooperation in scientific research for the benefit of mankind, particularly the importance of Antarctica to the global environment and ecosystems, as well as to act as an early-warning system on climate change and accidents". Taking into account the important role and expertise of WMO in monitoring the state and evolution of the atmosphere and its chemical composition within the World Weather Watch (WWW) and Global Atmosphere Watch (GAW) systems, Congress agreed that WMO should offer scientific and technical assistance to the above-mentioned study related to the atmospheric components, if funds are made available from the United Nations or other sources. In particular, the Congress felt that WMO should provide advice on the location of such a station in order to maximize its contribution to the Global Observing System, the Global Atmosphere Watch and the Global Climate Observing System.

2. When the General Assembly reviews this matter at its forty-sixth session the following options should be considered:

(a) Establishment of a new United Nations-sponsored station in Antarctica. In WMO's opinion this is probably not the best option from the point of view of cost and the logistical infrastructure required to support such station;

(b) Expansion of the observational capabilities at some existing stations to meet the United Nations programme requirements. This approach could be implemented on a basis of international cooperation, and funding of such programmes might be provided from the United Nations or other multilateral sources;

(c) Use of one of the stations now closed because of lack of funding (e.g. Leningradskya), but which has logistical infrastructure, equipment for standard observations and operating experience. The re-establishment of such a station might be made also on the basis of international cooperation, involving commitments from the United Nations system. In this case, it would be a United Nations-sponsored station, but expenditures for the establishment of this station would be much less than for the first proposed option.

3. WMO would be prepared to offer any scientific and technical assistance in the implementation of the decision of the General Assembly; the extent to which this will be required will depend of course on the option chosen.

INTERNATIONAL MARITIME ORGANIZATION

[Original: English]

[14 June 1991]

The aims of the station, i.e. the promotion of scientific research concerning the role of Antarctica in regulating the global environment and ecosystems, are fully supported by IMO. However, there are no specific technical and scientific issues within the mandate of IMO which would warrant at this stage a particular contribution for the establishment of a United Nations-sponsored Antarctic observation system. The role of such a station to act as an early-warning system on climate change and accidents involves meteorological observations, which in certain cases may be important for sustaining maritime safety.

ANNEX IV

Reply of Greenpeace International to the questionnaire on the establishment and operation of a scientific station in Antarctica

[Original: English]

[12 July 1991]

1. What were the principal motivating factors for the establishment of a scientific station in Antarctica?

Greenpeace established its World Park Base (WPB) at Cape Evans in January of 1987 with the aim of exposing the issues threatening the fragile Antarctic environment, and protecting the continent against future environmental degradation. The base's scientific research programme was carefully drawn up to support the above aims, and was dedicated to the following:

(a) Conducting research on the impact of human activity on the Antarctic environment;

(b) Monitoring and documenting of environmental agreement infractions;

(c) Raising public awareness of Antarctic issues and the World Park proposal;

(d) Supporting Greenpeace's request for observer status at Antarctic Treaty meetings.

2 & 3. In taking a decision on the establishment of a scientific station in Antarctica, what role did the following considerations play?

In order of importance:

Locale and/or geographic factors. After an in-depth environmental impact assessment, Cape Evans was chosen as the site of WPB because it was viewed as the best place to set up and later remove a base with little or no lasting impact on the surroundings. Issues taken into consideration for this decision were: presence of fauna and flora, S.P.A. (sites of protected areas) and S.S.S.I. (sites of special scientific interest), and how much the area was already impacted.

Operational requirements and logistical support. Due to its relatively thin ice sheet and ice-free area, Cape Evans was very accessible by ship from our berth in New Zealand, and represented a very strategic location for the establishment of the WPB station.

Nature of scientific research. Greenpeace established its scientific station in order to support its political objectives. Protecting Antarctica against the adverse effects of human activity, such as commercial whaling and mining, habitat and flora/fauna destruction, waste disposal and marine pollution were among Greenpeace's foremost objectives. The World Park Base science programme was designed to support these objectives through continuous monitoring of human impact on air, soil, water and wildlife. In addition, WPB has conducted research in conjunction with various scientific groups and universities, and provided them with eagerly needed field information.

Budgetary considerations. The budget for WPB was drawn up according to Greenpeace's stated objectives of setting up a base with minimum impact on the Antarctic environment through the use of alternative energy, energy efficiency, and total retrograding of waste. Other considerations included utmost physical safety and psychological comfort for the over-wintering team.

4. What kind of consultations did you find necessary to undertake with any other country having experience in operating a scientific station in Antarctica, and to what extent did the information obtained facilitate your decision?

Prior to establishing World Park Base, Greenpeace notified all of the Antarctic Treaty nations of its intentions and provided plans of the project. Greenpeace's non-governmental status, however, and the closed nature of the Treaty system prevented us from undertaking consultations, and information from scientific stations with previous operating experience in the Antarctic was not readily offered.

5. What influenced your judgement as to the particular type of research pursued? To what extent did your decision depend on the research already undertaken in Antarctica, and how did you avoid the probability of the duplication in research efforts?

The premise of WPB's scientific research programme was largely based on the premise that our intentions were not to compete with research already under way in Antarctica, but to add to the body of knowledge available. Through various Scientific Committee on Antarctic Research (SCAR) scientists and available scientific literature, Greenpeace identified areas of particular interest, such as the particulars of the Cape Evans area and the impact of bases, tourism, and fishing on the Antarctic environment. To a large extent, Greenpeace's decision to establish WPB was due to the fact that no data was available on the environmental impact of human presence on the continent, and very little day-to-day environmental impact monitoring had ever been undertaken. In that light, Greenpeace's scientific research programme was drawn up to fill the gap of measuring environmental degradation in the Antarctic and making those results widely known. In addition, Greenpeace participates in several ongoing collaborative scientific research projects.

6. In operating a scientific station in Antarctica did you find it necessary to seek the assistance of and to rely on cooperation of Governments having stations in the area?

Assistance from other nations operating in the Antarctic was not offered to Greenpeace, and our efforts were strongly discouraged. We believe, however, that cooperation should be more strongly encouraged to reduce the duplication of logistical efforts and research undertaken in Antarctica. Greenpeace believes that no scientific station should be established in the Antarctic unless it addresses a specific need that cannot be undertaken through other bases' facilities and programmes.

7. In your view, what role was relegated to cooperation with the organizations having expertise and interest in scientific research in Antarctica?

The Antarctic Treaty is based upon international cooperation and consensus decision-making. As such, Greepeace believes that Treaty nations should strive to cooperate as much as possible on most Antarctic issues and, in particular, to share scientific data and other relevant information. Greenpeace offers the results of its reports on base operation, environmental impact assessment and scientific research to all interested parties in order to encourage cooperation and disseminate the environmentally sound methodology that has been carefully researched and accessed.

8. Given the extremely difficult conditions for accurate telecommunications in Antarctica, what are the special liaison requirements?

The use of satellite communications is the key to maintaining an adequate and reliable link between Antarctica and the rest of the world. Satellite communications can prove difficult at inland sites, but are certainly satisfactory for coastal stations. A trained team of technicians is necessary at all times to maintain and operate this complex communications system used on any base. In addition, it is preferable to have a relay station somewhere close to the Antarctic that can function as a backup for short wave radio propagation. Such a relay station should be in regular contact with the Antarctic station and provide external support for logistics and coordination.

9. What guided you in deciding to operate a year-round scientific station or a seasonal one?

In order to establish political credentials in the Antarctic, it was important for Greenpeace to operate a year-round base with a comprehensive and consistent scientific research programme. In addition, due to the large number of bases on the continent, a year-round presence was the only way to keep a spotlight on the environmental degradation that is taking place continuously rather than on a seasonal basis.

10. What would be your advice concerning construction requirements for the station?

A careful environmental impact assessement must first be made at the proposed site, and an ongoing programme of impact monitoring must be carried through. To ensure minimum impact, all structures must have minimal contact with ground surface and be supported with beams and load-bearing feet. All buildings should be prefabricated and easy to assemble without the need for heavy machinery. Buildings should be thermally efficient, minimizing heat loss and allowing efficient use of wind and solar energy to meet power requirements. Ideally, all living and working spaces should be contained within an insulated outer shell raised off the ground with an external design that minimizes wind resistance and snow drift buildup. All structures should be built without the use of permanent fixing materials such as concrete and planned with eventual removal in mind. The structure or group of structures must complement the landscape.

11. On the basis of your experience, what could you suggest as to the means of making the operation of the scientific station cost-effective?

In order to make the installation and operation of a base in the Antarctic cost-effective the first cost-saving measure would be to move into an already existing base and share the operating cost, or to build minimal quarters in the perimeter of an existing base. If sharing is not a possibility, the sharing of planes and ships with another base should be looked into. Planning ahead of time in either scenario is very important. For instance, if prefabricated buildings are going to be used, they should be put together before reaching Antarctica. Personnel should be minimized by choosing very motivated people who are willing to do several jobs and help with a variety of tasks. Solar/wind power is an expensive initial investment, but will substantially lower fuel costs, and the environmental gain is obviously immeasurable. Finally, the use of automatic weather stations for various climatic and scientific measurements is very useful as they cut down on cost and human impact. These are used by most over-wintering bases in the winter months, but the development of automatic measues on an ongoing basis and for a variety of other parameters would make for the subject of a good study.

12. What kind of organizational structure is needed to monitor the operation of a scientific station? What role could be played by satellites or ships in this regard?

As revealed in the response to quesion eight above, satellite communication with a backup relay station is key to ensuring a reliable link between the base members and coordinators. A solid communication system enables the base leader to stay in regular contact with the Expedition Coordinator in Washington and Logistics Coordinator in New Zealand and logistical operations are monitored on an ongoing basis. The Greenpeace ship M.V. Gondwana is considered an inherent part of WPB, as it is responsible for the large task of resupplying the base each year, which includes monitoring the condition of the base structures, materials and equipment. The ship also transports campaigners to various bases where they undertake much of the inspection work.

ANNEX V

Illustrative cost estimates for some communication equipment, means of transportation and some basic equipment that may be necessary for the operation of a United Nations-sponsored station in Antarctica

Tentative communications budget for proposed United Nations presence in Antarctica

	Quantity	Cost $
Rear Link Equipment (H.F.)	2	180 000
(i) HF transceiver		
(ii) HF receiver		
(iii) Automatic link establishment		
(iv) Facsimile modem		
(v) Radio telegraph modems		
(vi) ARQ (automatic correction equipment)		
(vii) Computer and printer		
(viii) Plain paper facsimile unit		
HF Base Station for Antarctica communications	2	20 000
(i) 125 W HF base station		
(ii) Power supply		
(iii) Specialized antenna		
HF Mobile for long-range communications	10	80 000
(i) 125 W mobile unit		
(ii) Tuner		
(iii) Specialized antenna		
VHF repeater system/base station (system used as base-controlled repeater)	2	30 000
(i) 100-watt VHF repeater		
(ii) Specialized antenna		
(iii) Specialized coax feeder		
VHF Base Station	2	10 000
(i) 100-watt VHF base station		
(ii) Specialized antenna		
(iii) Specialized coax		
(iv) P.S.U.		

	Quantity	Cost $
Mobile VHF transceiver	10	30 000
(i) 100-watt VHF units (ii) Specialized antenna (iii) Specialized control cables, microphone and loudspeaker		
VHF Handie Talkie		30 000
(i) 20 specialized units		
Specialized towers		30 000

1. Quantity two 100-foot towers heavy duty Rohn minimum standard 45G preferably 65G.

2. Specialized heated guy wire assemblies to counteract ice formation.

3. Specialized anchor points to facilitate constructioin of ice platform.

4. Double guy wire requirement for Antarctic conditions.

Spare parts

Additional spare parts required due to remote location, calculate at 20 per cent instead of normal 10 per cent of total purchase.

Generators

1. Quantity two 170 KVA generators (minimum size) with parallel running load sharing, automatic synchronization plus distribution panel complete with heavy duty shelters.

2. Quantity one 170 KVA unit as emergency backup.

   Note: all three units in one shelter for preheating reasons.

3. Specialized fuel lines complete with preheated covering as standard.

4. Preheated engine oil system as standard.

		Cost $
5.	Specialzed fuel shelters complete with integral heating system to ensure diesel does not solidify, even when anti-coagulants have been added.	260 000
6.	8,000 hours running spares x 3	
7.	Specialized tools	
8.	10 per cent nominal spares holding	40,000
	Total	710,000

Ice-breaker/Ice-strengthened cargo ship

We have assumed that these types of vessels would be required for the initial deployment and perhaps for annual resupply. Under these circumstances, there would be no need for a permanent charter arrangement but instead for a timecharter. Timecharter, by definition, is the charterer (the United Nations in this case) paying owners a mutually agreed daily hire for the exclusive use of the whole vessel. The owners arrange and pay for the operation of the vessel and crew, but the charterers pay for all fuel consumed and all port expenses including cost of loading and discharge, etc. A timecharter rate excludes the cost of fuel so this cost would need to be added to the charter rate to arrive at an overall cost to the charterer.

In the summer months, a multi-purpose vessel with minimum or no icebreaking could be used for supply operations. A typical vessel of 12,000 deadweight (600,000 cubic foot hold capacity) and able to load breakbulk, containers (also on deck) and rolling stock would have a timecharter rate of about $US 6,500-8,000 daily. In winter months a full ice class vessel would cost approximately 10 per cent more. An ice class vessel of 25,000 deadweight would cost about $US 11,000-12,000 daily. In estimating the overall cost including fuel (but excluding port costs, stevedoring, etc.), one should calculate an average fuel consumption of about 30-35 tons daily at current fuel costs of about $US 100 per ton, which should be added to the above timecharter estimates.

Cargo aircraft/Helicopters/Fixed-wing aircraft

Specially adapted aircraft are not easily available. As an example, there are only eleven of the LC 130H aircraft (ski equipped) in use world wide at the present time. Of these, seven are owned by the United States Department of State and the National Science Foundation and are used in Antarctica. The remaining four are owned by the United States Army Reserve and are stationed at Narrangansett. We have therefore omitted any estimates on this type of modified aircraft. Estimates for helicopters/fixed-wing aircraft are as follows:

Twin Otter (DHC6)

$3,000 per day, $325 per flying hour plus a Position/Disposition charge of $60,000.

Helicopter (B212)

$3,250 per hour (60 hours per month) plus a Position/Deposition charge of $100,000.

Vehicles

	$
Four-wheel-drive pick-up	10 000
All-wheel-drive dump truck	150 000
All-wheel-drive flatbed	80 000
Tracked vehicle	150 000
Articulated vehicle	100 000
Caterpillar D-8	220 000
Motor toboggan	7 000
Snow Blower	100 000
Grader	150 000
Total	967 000

Meteorological equipment

Thermometer, Max/min	56
Mercury Barometer	1 000
Aneroid Barometer	1 195
Hydro-Thermograph	1 295
Electronic Anemograph	5 000
Sun Photomoter/Electric Integrator	6 000
Solarimeter/Pyranometer	445
Pyrheliometer	216 250
Dobson's Ozone Spectrometer	10 000
Radiosonde, 403 MHz Met only	27 000
Ozone Sonde	40 000
Radiation Sonde	30 000
Rawin System (403 MHz only)	70 000
Windfinding Radar	605 000
Automated Meteorological Observation System	23 100
Total	1 036 341